

What Is Claimed Is:

1. A method for optimizing customer experience of a real-time system comprising:

- 5 collecting statistics from a network;
 using the statistics to choose a plurality of parameters;
 using the plurality of parameters to manipulate playback properties of
 the real-time system to optimize the customer experience as measured on a
 physiological.

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2. The method of claim 1 wherein the step of collecting statistics from a network comprises measuring network conditions delay, jitter and loss.

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3. The method of claim 2 wherein the step of using the statistics to choose a plurality of parameters comprises for the measured delay, jitter and loss, determining a jitter buffer length and a playback ratio that yield a best R-factor, wherein the R-factor is determined by the equation

$$R = R_0 - Ie_c - Ie_{loss} - Ie_{pbr} - Ie_{DD} .$$

4. A method of optimizing jitter buffer length and playback ratio to improve call quality comprising the steps of:

measuring network conditions delay, jitter and loss; and

for the measured delay, jitter and loss, determining a jitter buffer length and a playback ratio that yield a best R-factor, wherein the R-factor is determined by the equation $R = R_0 - Ie_c - Ie_{loss} - Ie_{pbr} - Ie_{DD}$.

5. The method of claim 4 wherein the step of determining a jitter buffer length and a playback ratio that yield the best R-factor comprises the steps of:

a) setting the jitter buffer length and the playback ratio to an initial value;

b) determining R_0 ;

c) determining Ie_c ;

d) determining Ie_{loss} ;

e) determining Ie_{pbr} ;

f) determining Ie_{DD} ;

g) calculating $R = R_0 - Ie_c - Ie_{loss} - Ie_{pbr} - Ie_{DD}$;

h) determining whether an optimum value of R has been achieved;

and

i) when the optimum value of R has not been achieved, changing the value of jitter buffer length and/or playback ratio and repeating steps b through h.

6. The method of claim 5 wherein the step of determining Ie_{loss} comprises:

determining an initial playback time;
 determining an initial jitter buffer overflow;
 using the initial jitter buffer overflow to determine an initial jitter buffer loss;
 determining a gain in jitter buffer length;
 using the gain in jitter buffer length to determine a final playback time;
 determining a final jitter buffer overflow;
 using the final jitter buffer overflow to determine a final jitter buffer loss;
 determining an average jitter buffer loss from the initial jitter buffer loss and the final jitter buffer loss; and
 using the average jitter buffer loss to determine Ie_{loss} .

7. The method of claim 6 wherein the step of determining an initial playback time comprises solving the equation $initial\ pbt = jb_0 + delay$.

8. The method of claim 6 wherein the step of using the initial jitter buffer overflow to determine an initial jitter buffer loss comprises solving the equation $initial\ jb_{loss} = 1 - [(1 - loss) \times (1 - initial\ jitter\ buffer\ overflow)]$.

9. The method of claim 6 wherein the step of determining a gain in jitter buffer length comprises solving the equation $gain\ in\ jitter\ buffer\ length = (1 - pbr) \times BOS$.

10. The method of claim 6 wherein the step of using the gain in jitter buffer length to determine a final playback time comprises solving the equation $final\ pbt = jb_0 + delay + gain\ in\ jitter\ buffer\ length$.

11. The method of claim 6 wherein the step of using the final jitter buffer overflow to determine a final jitter buffer loss comprises solving the equation $final\ jb_{loss} = 1 - [(1 - loss) \times (1 - final\ jitter\ buffer\ overflow)]$.

12. An apparatus for optimizing customer experience of a real-time system comprising:

a device for collecting statistics from the network;

5 a control apparatus operatively coupled to the device for manipulating playback properties of the real-time system; and

an optimizer operatively coupled to the device for using the statistics to choose a plurality of parameters for the control apparatus, wherein the plurality of parameters are chosen to optimize the customer experience as
10 measured on a physiological scale.

13. An apparatus for optimizing jitter buffer length to improve call quality comprising:

a jitter buffer;

5 a voice decoder operatively coupled to the jitter buffer for controlling a rate at which voice data is removed from the jitter buffer;

a voice resampler operatively coupled to the voice decoder for controlling a number of bits removed from the voice decoder; and

10 a playback optimizer operatively coupled to the jitter buffer and the voice resampler for receiving statistics on a communication link from the jitter buffer, for using the statistics to determine a jitter buffer length and playback ratio that yield an optimum score on a physiological scale and for sending the jitter buffer length and playback ratio to the voice resampler to improve call quality.

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